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ONTARIO WATER
RESOURCES COMMISSION

ANNUAL REPORT 1964

ONTARIO MINISTRY OF ENVIRONMENT
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Brampton-Chinguacousy

water pollution control plant

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DIVISION OF PLANT OPERATIONS

Ontario Water Resources Commission

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Brampton - Chinguacousy :
water pollution control plant.
81777

ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
Town of Brampton.

Reeve and Members of Council
Township of Chinguacousy.

Gentlemen:

We are pleased to provide you with the 1964 Operating Report for the Brampton-Chinguacousy Water Pollution Control Plant, OWRC Project No. 58-S-14.

By continuing the mutual cooperation which has existed in the past, we can look forward to greater progress in the field of water pollution control.

Yours very truly,

D. S. Caverly,
General Manager

MOE
BRA
WAT
1964
ASFB

ASFB

General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Brampton-Chinguacousy Water Pollution Control Plant, OWRC Project No. 58-S-14 for 1964.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B C Palmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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FOREWORD

This report describes the operation of this project for the year 1964. It includes a detailed description of the project, summary of operation, graphs and charts showing quality and quantity information, and project cost data.

This information will be of value to the municipality in assessing the adequacy of the works in meeting existing requirements and in projecting its capability to meet future expected demands. The cost information will be of particular interest to those concerned with developing and maintaining revenue structures.

The preparation of this report has been a cooperative effort of several groups within the Division of Plant Operations. These include the Statistical Section, Brochures Officer and the Regional Supervisor. However, the primary responsibility for the content has been with the Regional Operations Engineer. He will be pleased to discuss all aspects of this report with the municipality.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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BRAMPTON – CHINGUACOUSY

water pollution control plant

operated for

THE TOWN OF BRAMPTON

and

THE TOWNSHIP OF CHINGUACOUSY

by the

ONTARIO WATER RESOURCES COMMISSION

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L. E. Owers

COMMISSION SECRETARY

W. S. MacDonnell

DIVISION OF PLANT OPERATIONS

DIRECTOR: B. C. Palmer

Assistant Director: C. W. Perry
Regional Supervisor: A. C. Beattie
Operations Engineer: A. Clark

801 Bay Street **Toronto 5**

'64 REVIEW

This report gives the significant operating data for the Brampton Chinguacousy Water Pollution Control Plant in 1964.

It is noted that the cost for 1964 is an increase of over 40% from 1963. This is due to the fact that the plant was expanded during 1963 and the 1964 plant is much bigger more efficient and more expensive. This higher efficiency is reflected in the fact that the cost per pound of BOD removed is reduced by 100 percent.

The flow is again increased to a point where even the expanded plant facilities are overtaxed. The total for 1964 is up 50 percent over 1963. The average flow in 1964 was 2.2 mgd.

This means the average flow for the year exceeded the design flow and that many times the flow doubled and tripled the plant capacity.

GLOSSARY

BOD	biochemical oxygen demand (a measure of organic content)
cfm	cubic feet per minute
comminution	shredding of solids into small fragments
DWF	dry weather flow
effluent	outflow
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpcd	gallons per capita per day
gpm	gallons per minute
grit	sand, dust, stones, cinders and other heavy inorganic material
influent	inflow
lin. ft.	lineal feet
mgd	million gallons per day
mlss	mixed liquor suspended solids
ppm	parts per million
ss	suspended solids
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)

HISTORY

1956 - 1964

INCEPTION

In 1956, the Town of Brampton commenced discussions with the Ontario Water Resources Commission for the construction of a water pollution control plant in the northern end of the Township of Toronto. Proctor and Redfern were the consulting engineers for the scheme.

APPROVAL

In 1957, the Town of Brampton entered into an agreement with the OWRC for the financing, construction and operation of the plant.

CONSTRUCTION

Andeen Construction Limited of Brampton received the contract for the construction of a 1 MGD water pollution control plant in August 1958 and work commenced soon afterwards.

The Commission commenced operation of this project in January of 1960.

Truline Construction Company Limited completed a 1 mgd extension to the plant in September 1963.

TOTAL COST

The total cost of the project was $1,023,100.

IRVINE GREGORY

Project Staff

CHIEF OPERATOR

Mr. Irvine Gregory joined the Commission on January 25, 1960 as an operator at the Brampton plant. He later became Chief Operator, in which capacity he has proved capable and conscientious.

OPERATOR

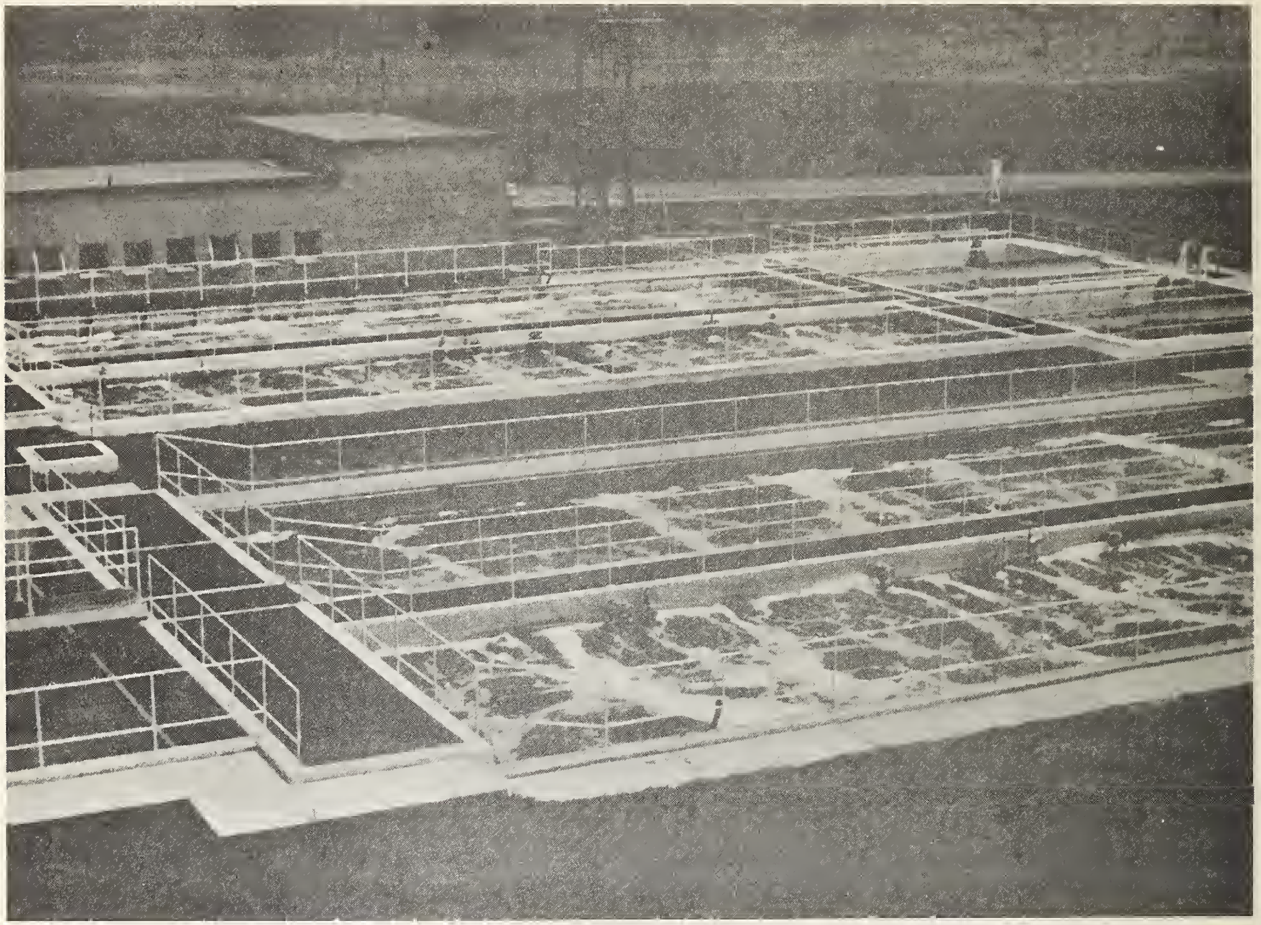
Mr. A. P. Friesen joined the staff at the Brampton plant in April 1960 as an operator. Prior to joining the Commission, Mr. Friesen was employed as a carpenter. Mr. Friesen has proved to be an able operator.

OPERATOR

Mr. D. J. Bailie joined the Brampton staff in May 1962 and like Mr. Gregory and Mr. Friesen has proved to be a capable and reliable employee.

CASUAL LABOUR

Casual help is employed for grounds maintenance during the summer.



Description of Project

INFLUENT WORKS

The waste water enters the plant through two gravity sewers, 42 inch and 27 inch in diameter. There is also 10 inch forcemain from Bramalea. It is then screened to remove large objects and passed through a barminutor which screens and shreds the larger particles to a size suitable for handling in the treatment plant. From this point, it flows to the primary sedimentation tanks.

PRIMARY SEDIMENTATION TANKS

The two primary sedimentation tanks are designed to provide an adequate detention period to allow the heavier solids to settle out, and for the removal of surface scum and grease. The heavier solids which settle out to the bottom of the tank and surface scum are collected by a scraper mechanism and withdrawn to a sludge pit from where they are pumped to the primary digester.

The primary sedimentation tanks are designed to provide sufficient detention to allow removal of 30-35% of the heavy organic material.

The settled waste water flows over the effluent weirs and discharges to the aeration tanks.

AERATION

Settled sewage flows from the primary

sedimentation tanks to the four aeration sections. There it is mixed with activated sludge which is returned from the final sedimentation tanks and aerated.

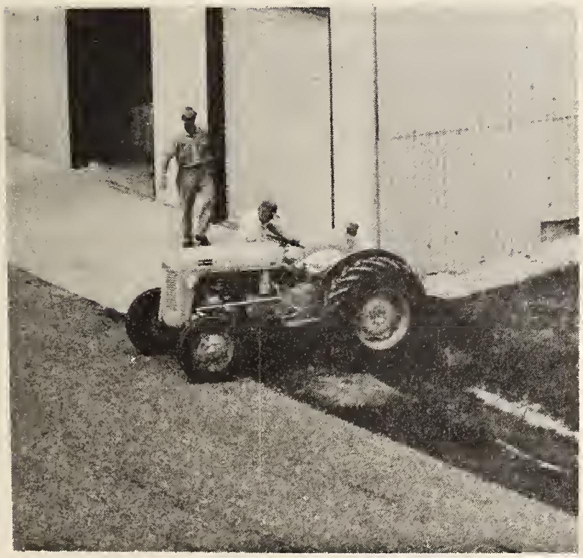
The aeration sections retain the sewage for 8 hours at a flow of 2.0 million gallons per day. Air is supplied by three blowers with a usable capacity of 1700 cubic feet of air per minute, and a standby capacity of 850 cubic feet per minute.

FINAL SEDIMENTATION

The aerated mixed liquor from the aeration sections is retained in four final sedimentation tanks for 2 3/4 hours at design flow. This allows the activated sludge to settle. It is collected from the bottoms of the tanks and returned to the aeration sections. (Excess activated sludge is returned to the primary sedimentation tanks and is pumped from there to the digesters). The remaining liquid flows over the weirs of the final sedimentation tanks to the chlorine contact chamber.

DIGESTION

Sludge digestion in this plant is performed in two stages, called primary and secondary digestion.



TRACTOR OUTSIDE INFLUENT WORKS

PRIMARY DIGESTER AND CONTROL BUILDING

The sludge from the primary tanks is pumped, with excess activated sludge to the primary digester. In the absence of air, and in a regulated temperature of 90°F., the decomposing or digestion process begins. Constant agitation within the tank ensures overall treatment.

The raw sludge is broken down by anaerobic bacterial action and, when thoroughly digested, is a thick, black, odourless liquid.

The secondary digester receives the digested material from the primary and completes the process. The secondary digester is not agitated but is allowed to be quiescent. The supernatant is decanted and returned to the treatment process.

Sludge gas, principally methane, formed during the process is used as a fuel for the heat exchanger and boiler supplying heat to the digester and buildings. Oil is used as standby fuel.

CHLORINATION

From the final sedimentation tank the effluent flows to a chlorine contact chamber where it is chlorinated to reduce the bacterial count to within acceptable limits. It is then discharged to the Etobicoke Creek.

PROJECT COSTS

LONG TERM DEBT (Total Capital Cost)	$1,023,100.51

The total cost to the municipalities during 1964 was as follows:

NET OPERATING			$ 48,798.02
DEBT RETIREMENT			21,149.36
RESERVE			
Stage 1	(Brampton	$ 4,731.88	
	(Chinguacousy	2,750.12	
Stage 2	(Brampton	1,789.00	
	(Chinguacousy	1,789.00	
			$ 11,060.00
Interest Charged			$ 56,085.29
TOTAL			$ 137,092.67

RESERVE ACCOUNT

Balance at January 1, 1964			
Stage 1	(Brampton	$20,400.94	
	(Chinguacousy	6,758.55	
			$ 27,159.49
Deposited by municipalities			11,060.00
Interest Earned			
Stage 1	(Brampton	$ 1,223.57	
	(Chinguacousy	442.09	
Stage 2	(Brampton	48.14	
	(Chinguacousy	48.14	
			$ 1,761.94
			$ 39,981.43
Less Expenditures			-
Balance at December 31, 1964			$ 39,981.43

DEBT OUTSTANDING:	$ 914,741.19

MONTHLY COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	1556.75	728.41	238.62	6.35	527.47		11.40			44.50	
FEB	2077.77	825.28	243.12	115.97	434.05	(350.00)	57.89	29.87	421.50	64.32	235.77
MARCH	3743.22	830.54	243.12		442.06	1148.05	136.51		407.64	535.30	
APRIL	4755.29	951.25	243.12		459.29	(350.00)	55.15	3248.62		63.97	83.89
MAY	4005.87	1347.44	352.56		450.38	1017.01	94.11	624.05	76.53	43.79	
JUNE	3307.91	1058.94	365.76		443.10	(525.00)	121.57	300.00	88.12	1833.00	222.42
JULY	3817.93	913.36	583.94		454.54	1596.10	81.36	53.77	102.99	31.87	
AUG	3270.50	1007.68	462.08		467.30		79.87		200.41	829.70	223.46
SEPT	2306.43	639.01	565.36		468.19	(264.73)	56.39	9.28	41.08	791.85	
OCT	7193.21	851.79	547.08		503.52	623.05	166.57	1329.22		2945.02	226.96
NOV	2985.19	1055.54	382.10		498.77	448.05	99.02		467.94	33.77	
DEC	2468.93	1354.77	475.08		569.41	(32.37)	(31.78)	236.80	(326.76)	74.49	149.29
TOTAL	* 41489.00	11564.01	4701.94	122.32	5718.08	3310.16	928.06	5231.61	1479.45	7291.58	1141.79

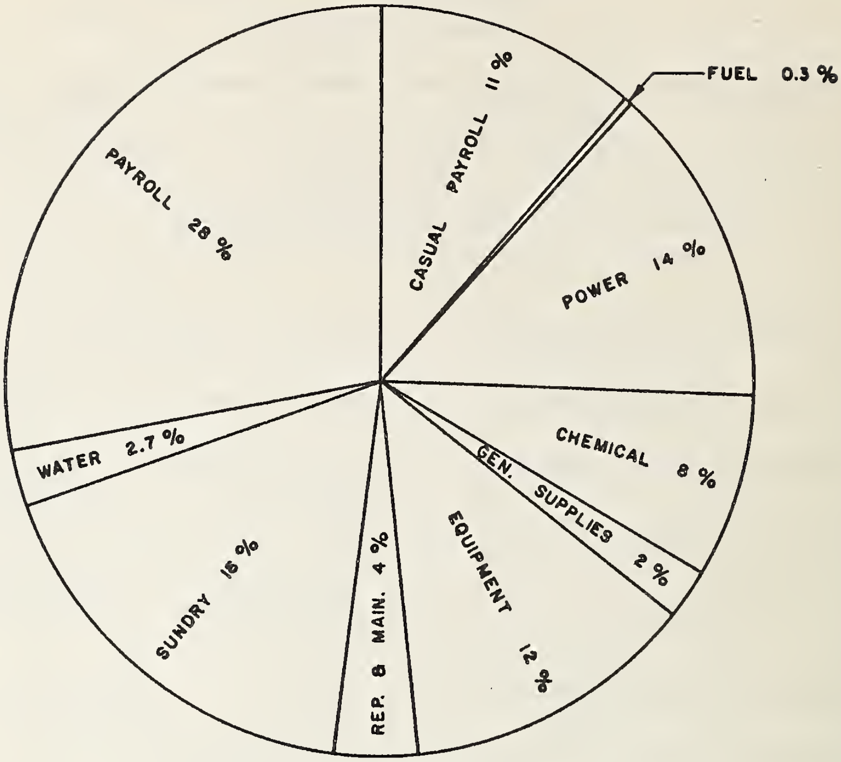
* DOES NOT INCLUDE COST OF OPERATING PUMPING STATION, WHICH WAS $7,309.02
BRACKETS INDICATE CREDIT

YEARLY COSTS

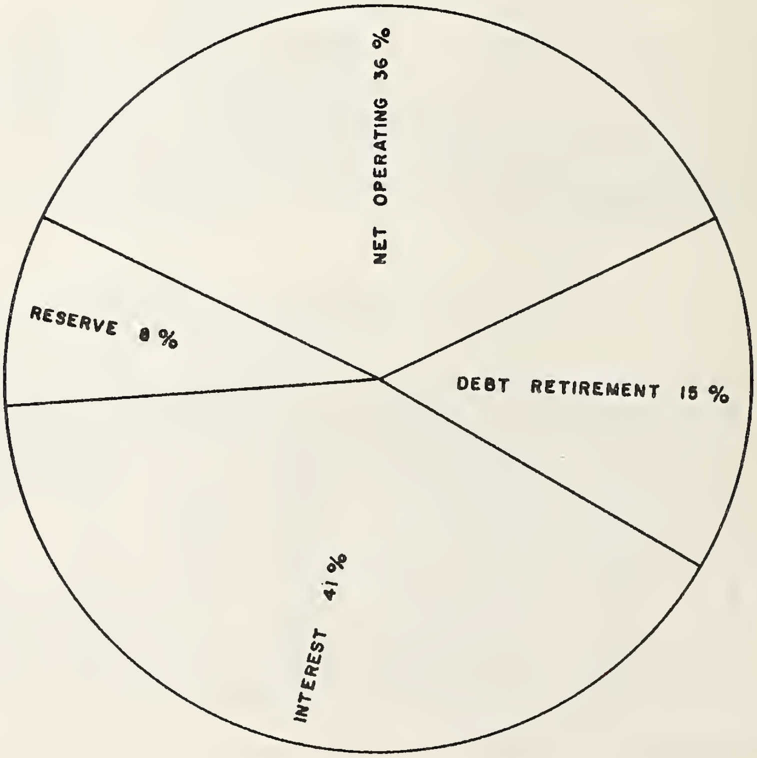
YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS	COST PER L.B. OF BOD REMOVED
1961	345.128	$ 25,295.74	$ 5.66	$ 73.30	$ 0.03
1962	441.847	27,441.44	5.78	62.20	0.02
1963	539.173	29,054.11	5.11	53.90	0.02
1964	810.463	41,489.00	6.16	51.19	0.01

* BASED ON ANNUAL POPULATION ESTIMATE AND 3.9 PERSONS PER FAMILY

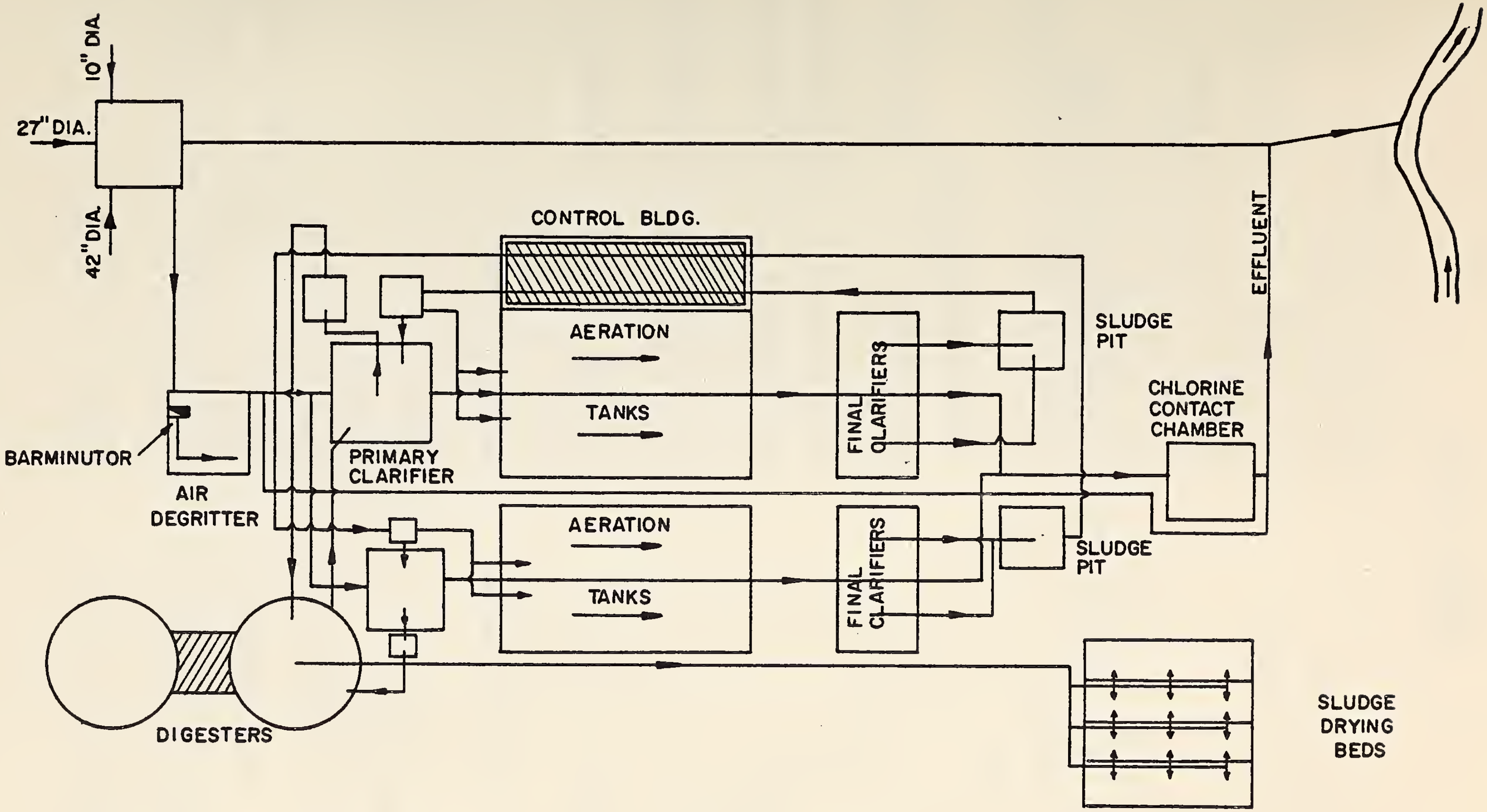
1964 OPERATING COSTS



TOTAL ANNUAL COST



Technical Section



FLOW DIAGRAM

Design–Data

GENERAL

Type of Plant - Activated sludge.

Design Population - 20,000 persons.

Design Plant Flow - 2 MGD.

Per Capita Flow - 100 gpd.

Five Day BOD -

Raw Sewage - 220 ppm
Removal - 90%

Suspended Solids -

Raw Sewage - 250 ppm
Removal - 95%

PRIMARY TREATMENT

COARSE SCREENING

Comminution

24" Model B Barminutor

Grit Removal

Air degrittor, five minute detention.

PRIMARY SEDIMENTATION

Two clarifiers - 42 ft. square by 10 ft. deep.

Detention Period - 2 hours 30 minutes.

Surface Settling Rate - 700 gallons per square foot of tank per day.

Overflow Rate - 6750 gallons per lineal foot of weir per day.

SECONDARY TREATMENT

Four aeration tanks.

Total capacity - 136,800 cubic feet.

Detention Period - 8 hours.

Return Sludge capacity - 75%

Air supply one cubic ft. per gallon

Three cyclo-blowers - 850 cfm capacity each

FINAL SEDIMENTATION

Four clarifiers - 32 ft. square x 10 ft. deep.

Detention Period - 2 hours 45 minutes.

Surface Settling Rate - 500 gallons per lineal foot of weir per day.

Weir Overflow Rate - 4720 gallons per lineal foot of weir per day.

CHLORINE CONTACT CHAMBER

30 ft. x 15 ft. x 7 ft. (L. W. D.)

Detention Period - 15 minutes.

Chlorinator Capacity - 100 lbs. per 24 hours.

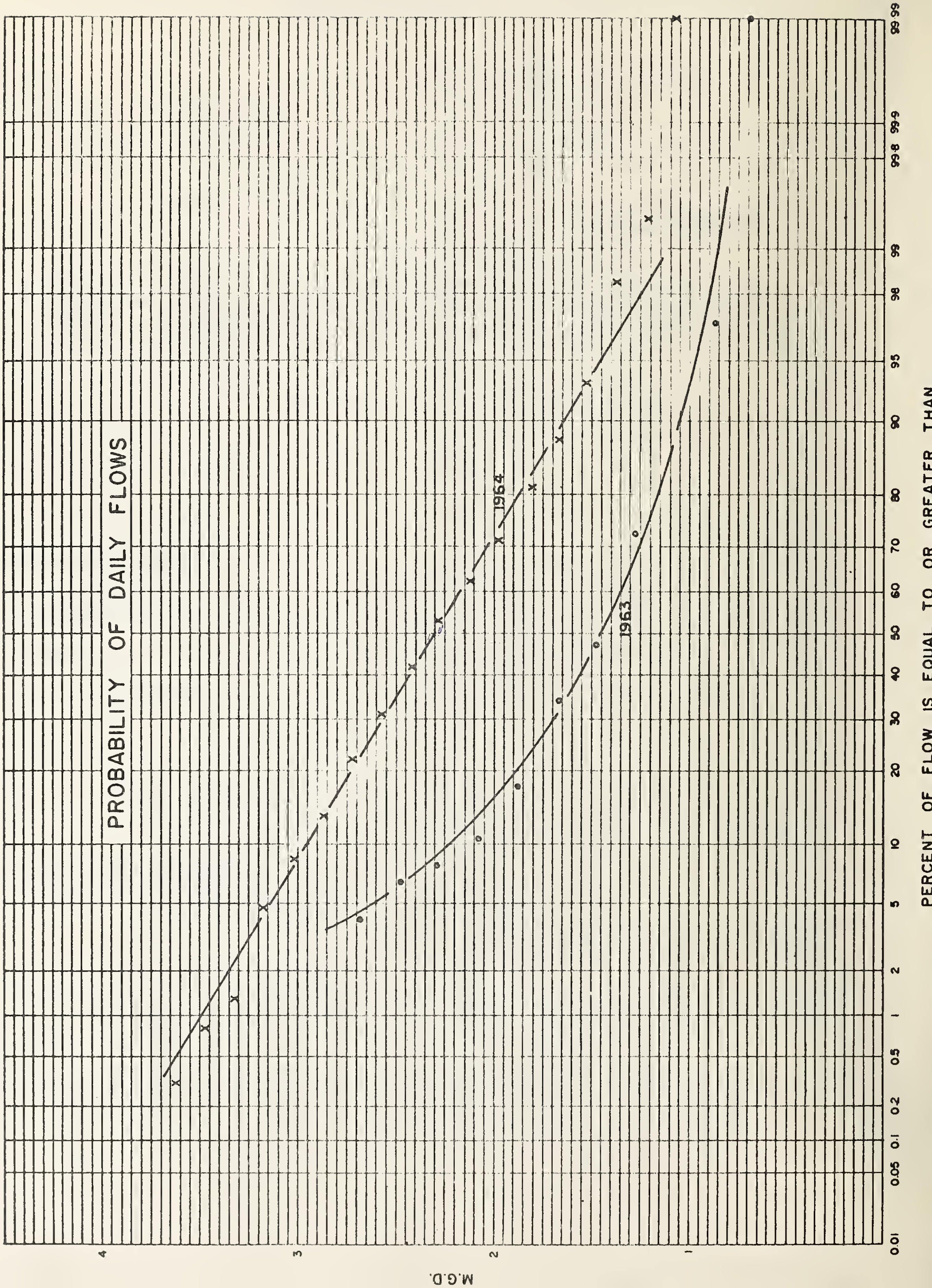
DIGESTER

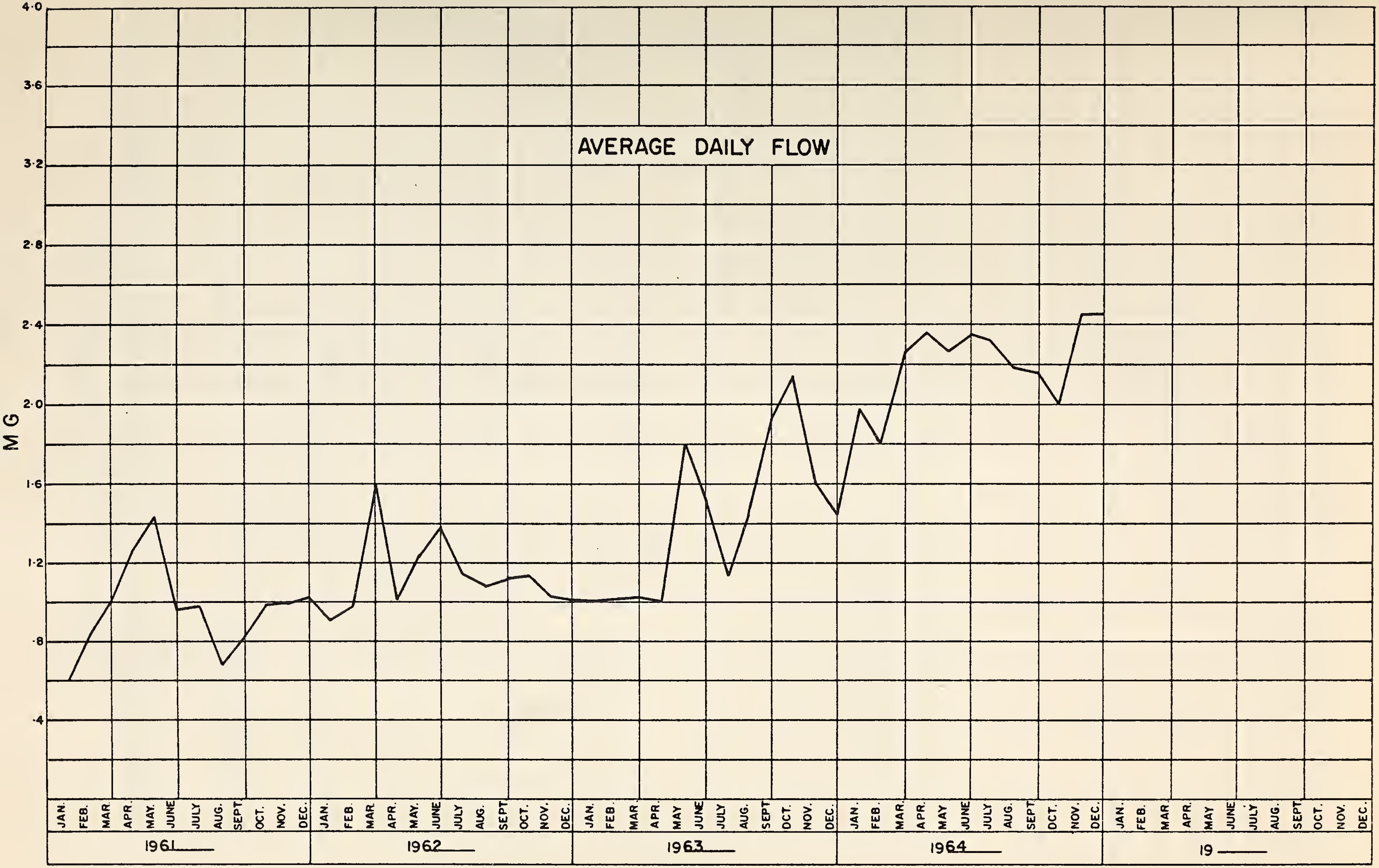
Two stage digestion
Two tanks - 50 ft. in diameter x 20 ft. deep
Capacity - 3.33 cubic feet per capita.
Loading - 2.25 lbs. solids per cubic foot of tank per month.

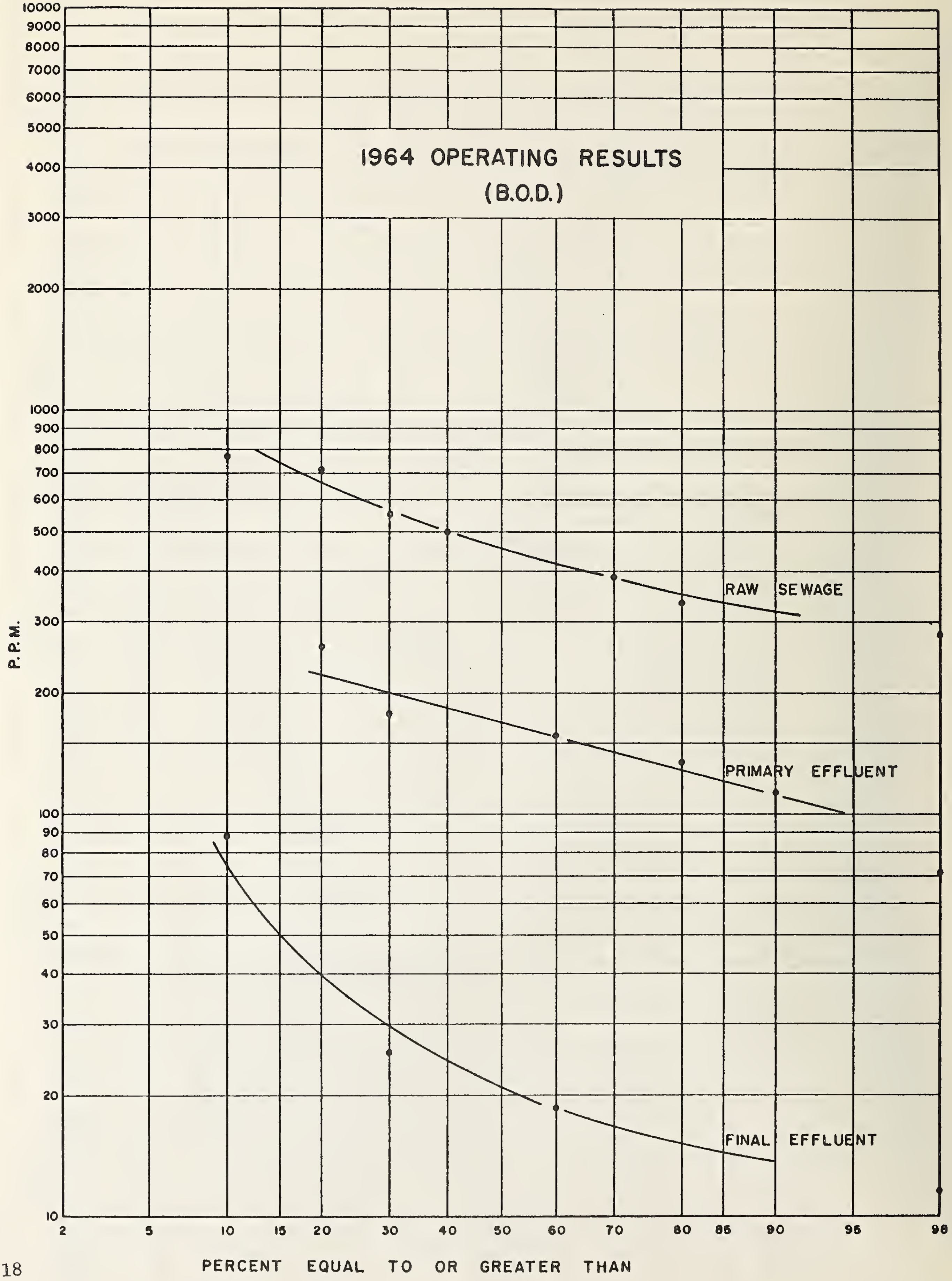
Sludge drying beds 1.87 sq. ft. per capita.

Process Data

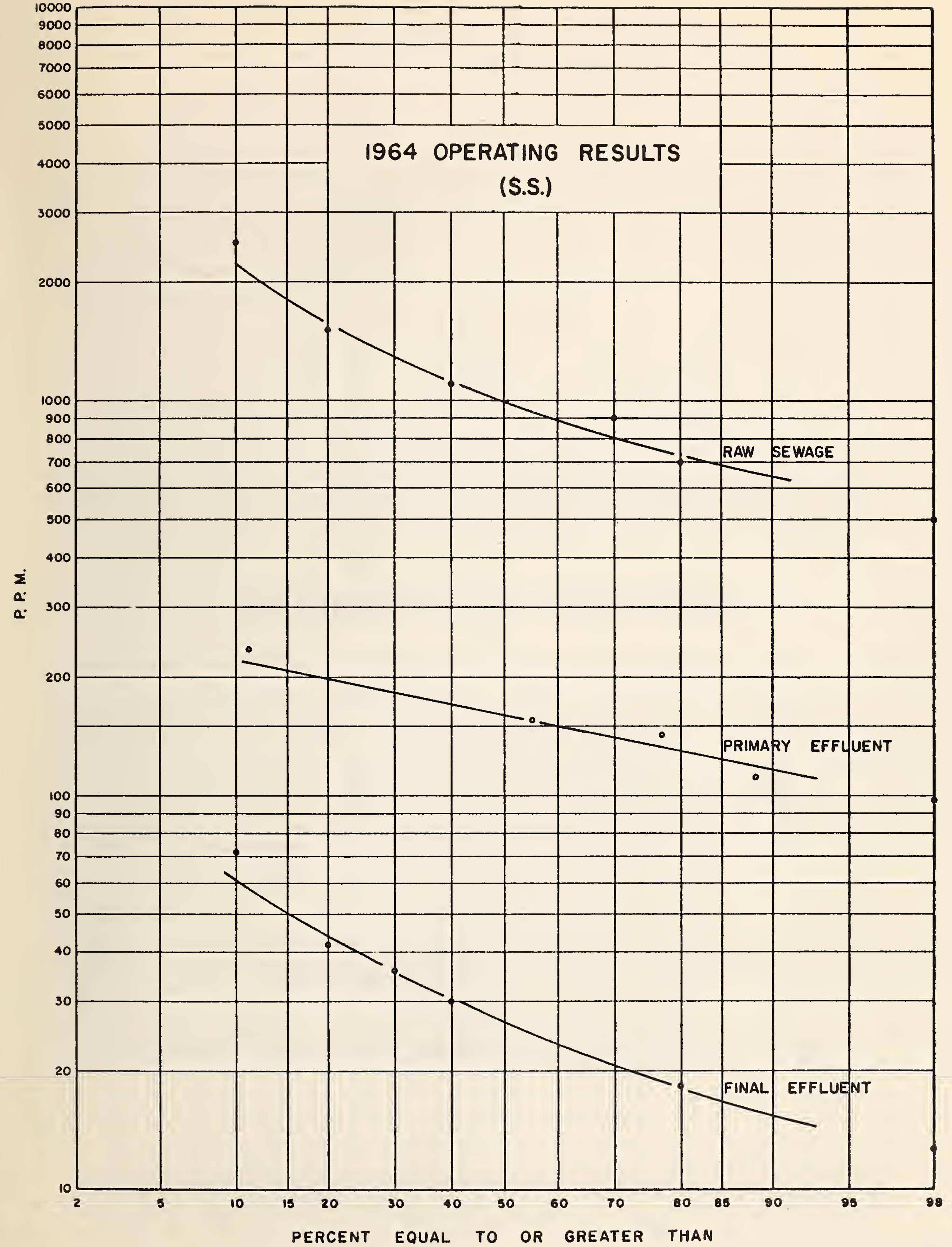
The maximum 24 hour flow recorded in 1964 was 3.609 mg registered during the week beginning July 12. The maximum monthly flow for the year occurred during the month of December when 75.94 mg were treated.


PROBABILITY OF DAILY FLOWS
1964
1963
M.G.D.
4
3
2
1
PERCENT OF FLOW IS EQUAL TO OR GREATER THAN
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99

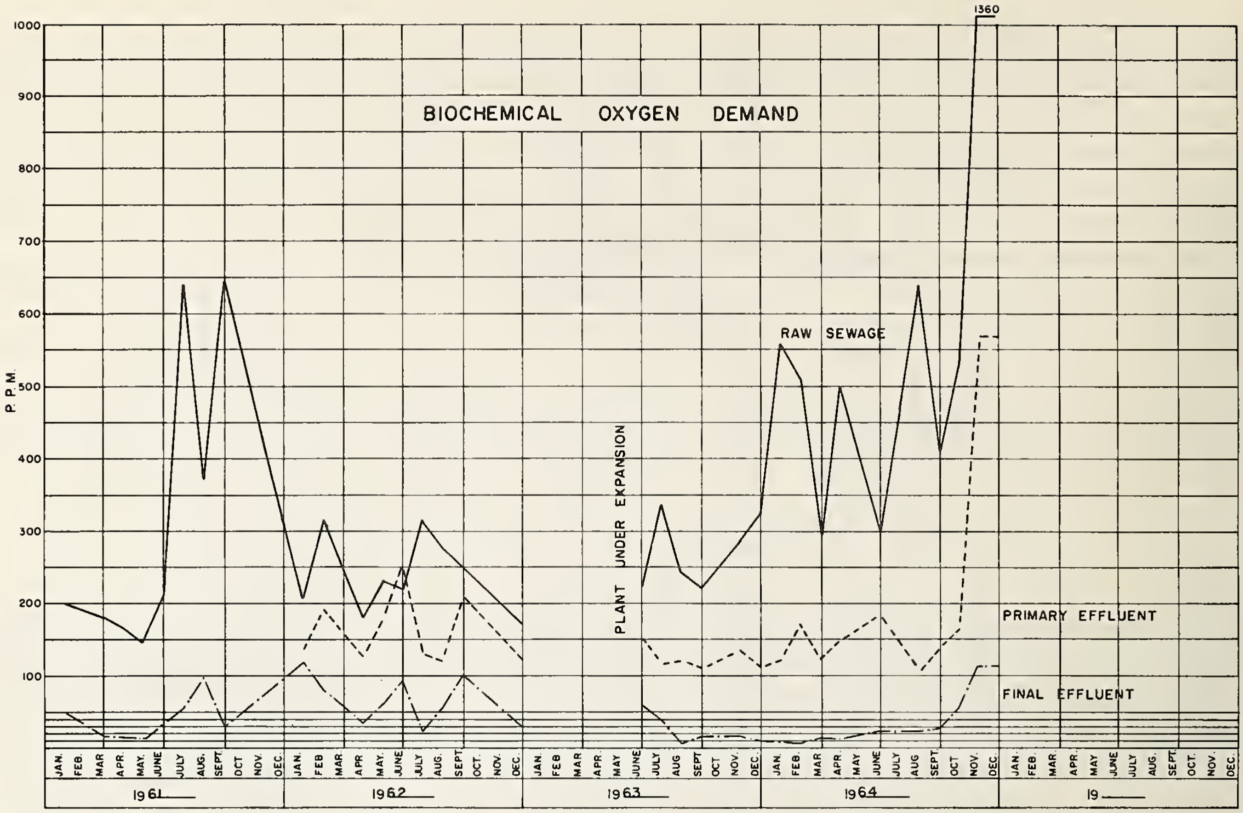

AVERAGE DAILY FLOW
M G
4·0
3·6
3·2
2·8
2·4
2·0
1·6
1·2
·8
·4
JAN.
FEB.
MAR.
APR.
MAY.
JUNE
JULY
AUG.
SEPT
OCT.
NOV.
DEC.
1961
1962
1963
1964
19



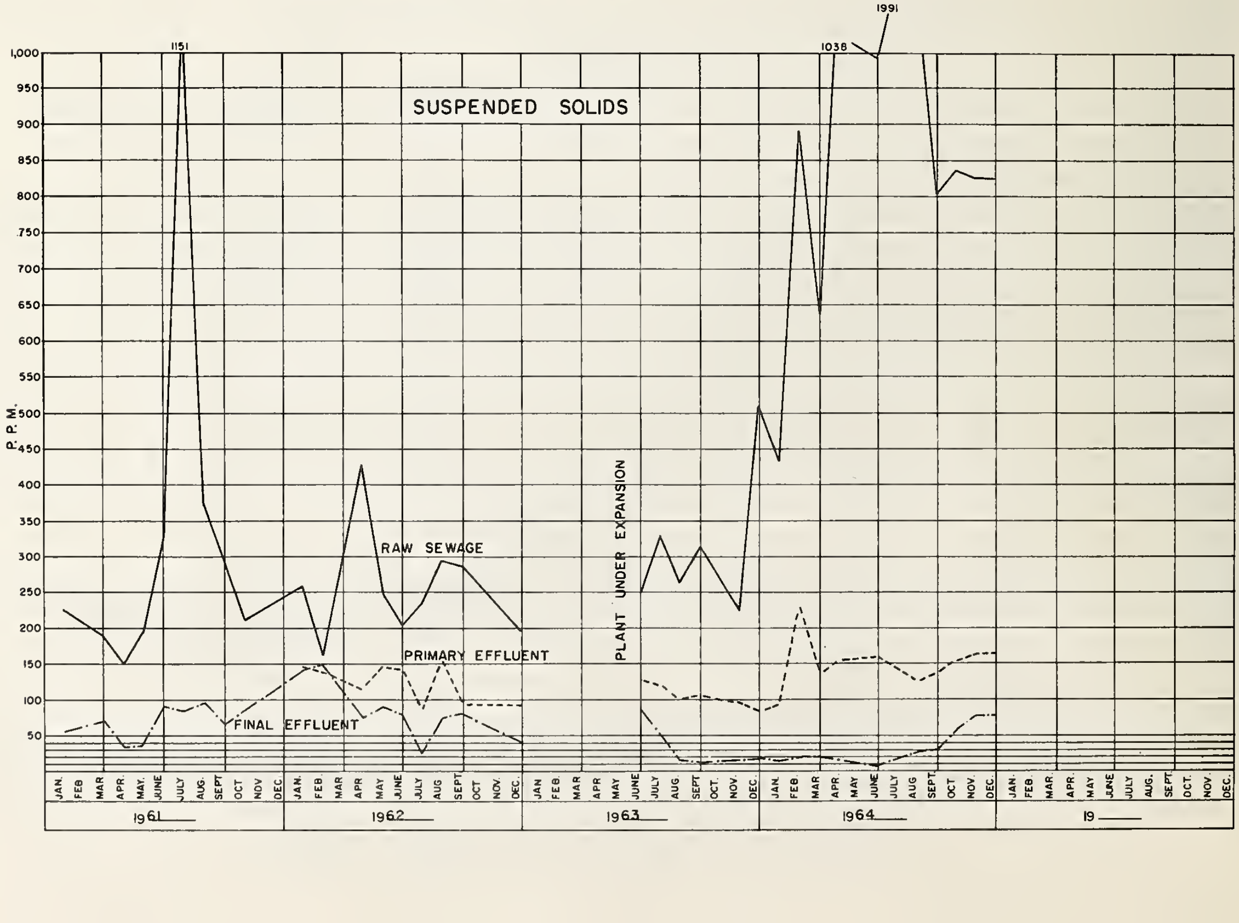
1964 OPERATING RESULTS
(B.O.D.)



1964 OPERATING RESULTS
(S.S.)



MONTHLY VARIATIONS



GRIT, B.O.D AND S.S. REMOVAL

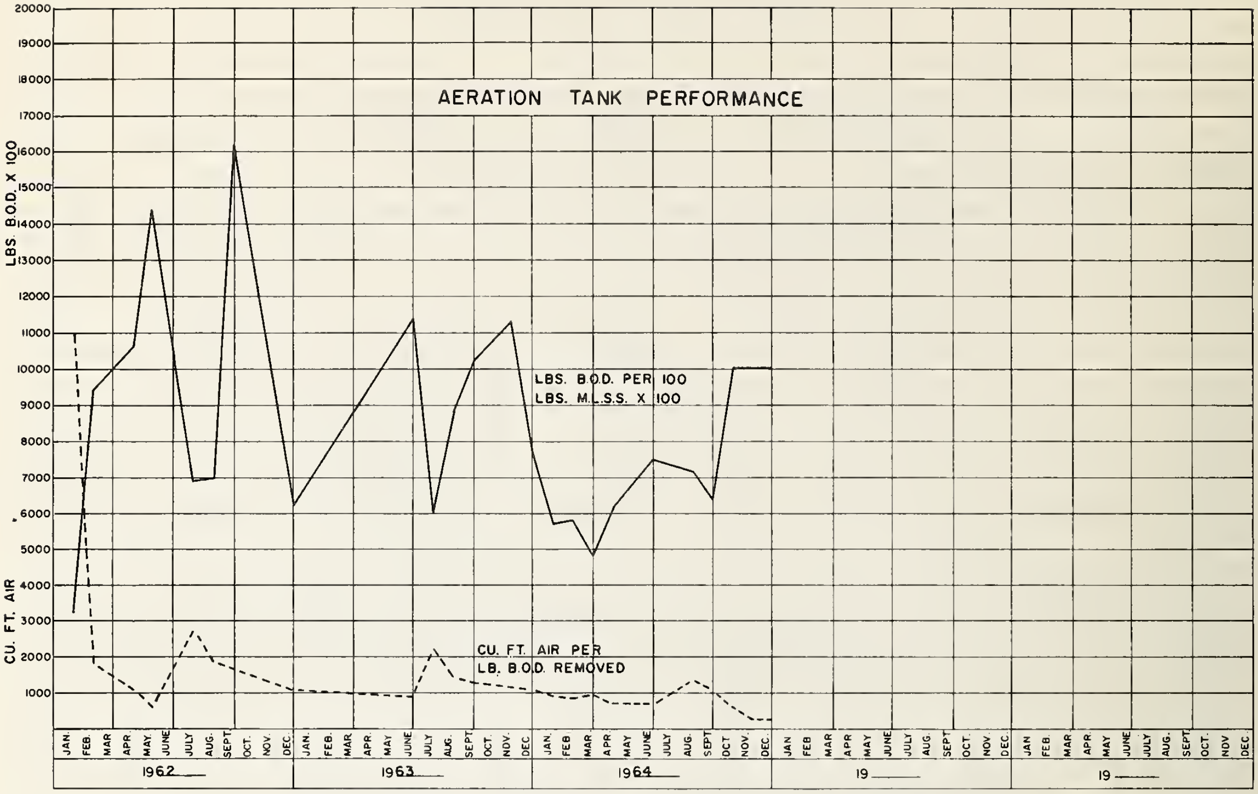
MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	INFLUENT P.P.M.	EFFLUENT P.P.M.	% REDUCTION	TONS REMOVED	
JAN.	560	10	98	167.4	432	14	96.5	127.2	567
FEB.	510	8.8	98	132	890	18	98	229.7	567
MAR.	295	12	96	98.9	646	20	97	218.8	702
APR.	500	11	98	173.7	1038	16	98.5	363	648
MAY	* 567	31	94.5	188.7	*940	30	97.0	320.4	567
JUNE	300	22	92.5	96.2	996	9	99.0	345.1	621
JULY	* 567	31	94.5	191.9	*940	30	97.0	325.8	702
AUG.	640	21	96.5	209.1	1991	28	98.5	663.1	693
SEPT.	410	27	93.5	124.6	802	30	96.0	251.1	486
OCT.	532	53	90.0	149.1	836	57	93.0	242.4	513
NOV.	1360	114	91.5	456.5	828	80	90.5	274.0	648
DEC.	* 567	31	94.5	203.5	*940	30	97.0	345.5	592
TOTAL	-	-	-	2172.0	-	-	-	3687.6	7306
AVG.	567	31	94.5	181.0	940	30	97.0	307.3	609

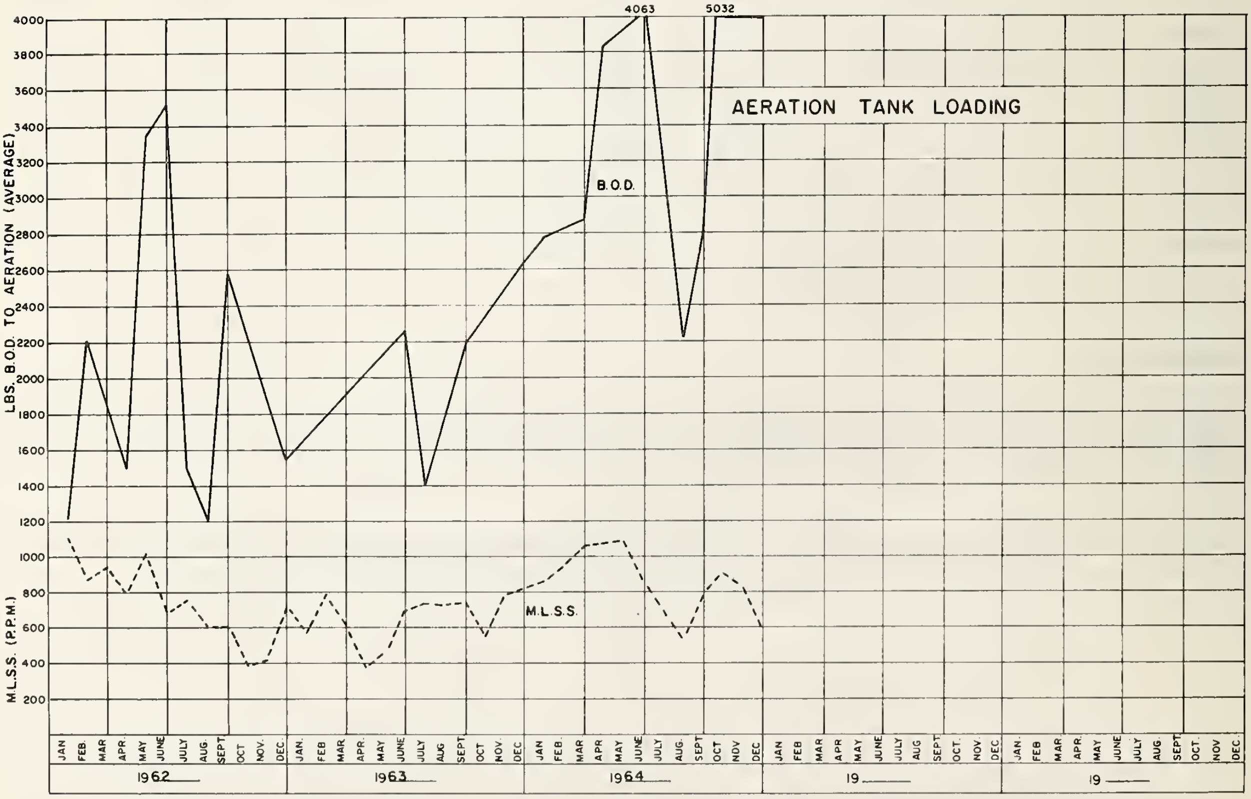
* Average value taken; no sample

COMMENTS

The average loading of 567 ppm BOD and 940 ppm SS was experienced in 1964. The average BOD and SS in the final effluent was 31 and 30 ppm respectively, both being in excess of the OWRC objectives of 15 ppm.

The average efficiencies obtained during the year however were 94.5% BOD removed and 97% SS removal. These high efficiencies are indicative of an overloaded plant.


AERATION TANK PERFORMANCE
LBS. B.O.D. X 100
CU. FT. AIR
20000
19000
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
LBS. B.O.D. PER 100
LBS. M.L.S.S. X 100
CU. FT. AIR PER
LB. B.O.D. REMOVED
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1962
1963
1964
19

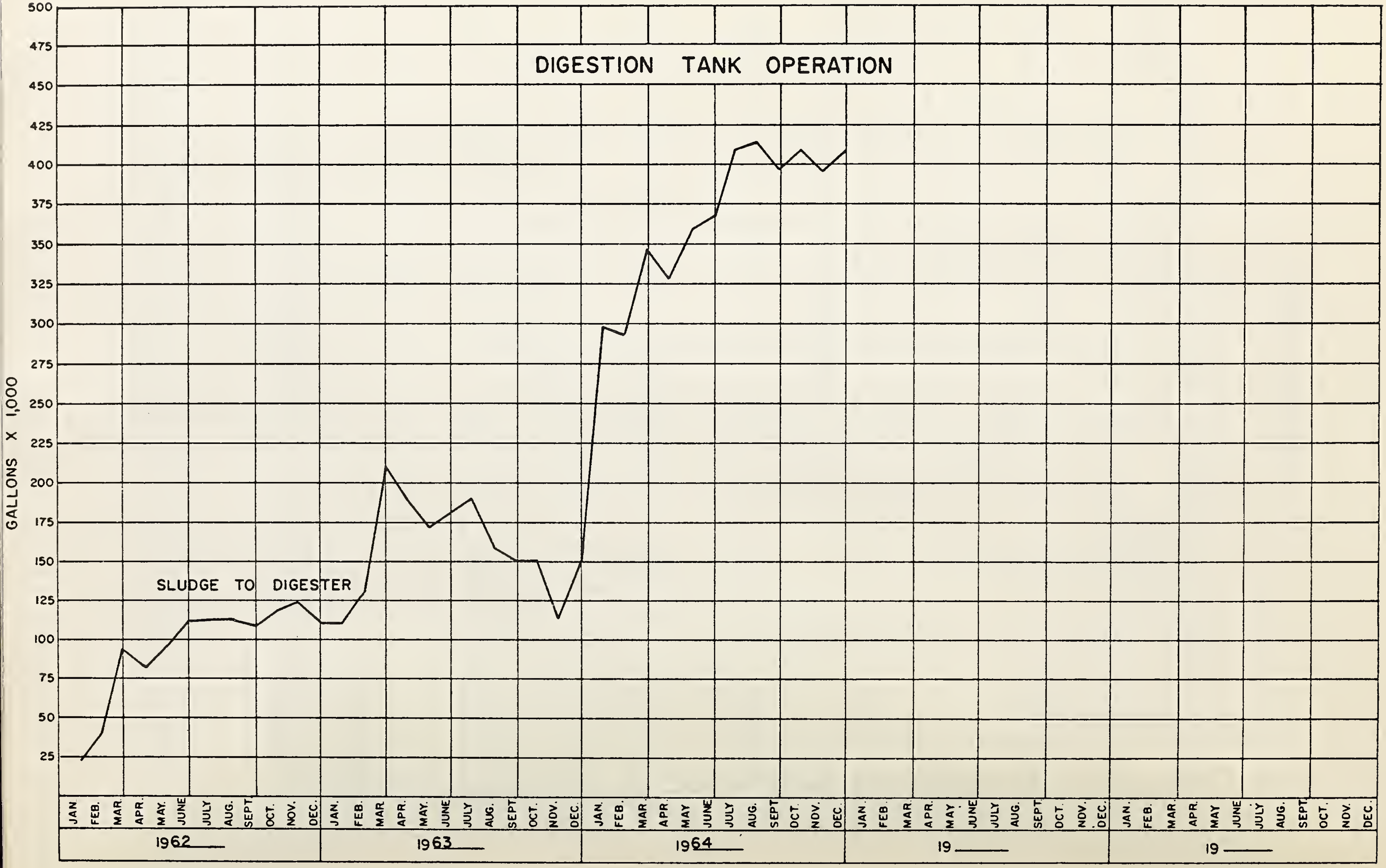

AERATION TANK LOADING
LBS. B.O.D. TO AERATION (AVERAGE)
M.L.S.S. (P.P.M.)
4063
5032
4000
3800
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
B.O.D.
M.L.S.S.
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.
1962
1963
1964
19

AERATION SECTION

MONTH	PRIM. EFFL B.O.D. P.P.M.	M.L.S.S. P.P.M.	LBS. B.O.D. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	120	853	57	965
FEBRUARY	170	934	58	839
MARCH	126	1049	48	943
APRIL	150	1069	64	686
MAY	-	1081	-	-
JUNE	185	873	82	683
JULY	-	689	-	-
AUGUST	106	548	72	1376
SEPTEMBER	140	781	64	1077
OCTOBER	265	896	99	610
NOVEMBER	570	837	299	216
DECEMBER	-	770	-	-
TOTAL	-	-	-	-
AVERAGE	203	865	94	822

COMMENTS

The low amount of MLSS carried is necessary because of the low amount of air available.


DIGESTION TANK OPERATION
SLUDGE TO DIGESTER
GALLONS X 1,000
500
475
450
425
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
25
JAN.
FEB.
MAR.
APR.
MAY.
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
1962
1963
1964
19
19

DIGESTER OPERATION

MONTH	SLUDGE TO DIGESTERS			SLUDGE FROM DIGESTERS			GAS PRODUCED 1000'S Cu. Ft.
	1000'S CU. FT.	% SOLIDS	% VOL. MAT.	1000'S CU. FT.	% SOLIDS	% VOL. MAT	
JAN.	47.69						
FEB.	47.23						
MAR.	55.69						
APR.	52.67						
MAY	57.31						
JUNE	58.69	10.90					
JULY	65.58						
AUG.	66.15	8.37					
SEPT.	63.46						
OCT.	65.58						
NOV.	63.46						
DEC.	65.58						
TOTAL	709.09						
AVG.	59.09	9.64					

COMMENTS

The digesters became overloaded and experiments were conducted with thermophylic digestion. These experiments resulted in effective digestion.

Sludge is spread on plant property and excess sludge is removed by tank truck.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	60.855	1126	1,85
FEBRUARY	52.681	1135	2.15
MARCH	69.897	1355	1.94
APRIL	71.035	1464	2.06
MAY	70.414	2152	3.06
JUNE	69.922	2707	3.87
JULY	71.596	2941	4.11
AUGUST	67.560	2768	4.10
SEPTEMBER	65.042	2597	3.99
OCTOBER	62.246	2701	4.34
NOVEMBER	73.275	2704	3.69
DECEMBER	75.940	2573	3.39
TOTAL	810.463	26223	-
AVERAGE	67.539	2185	3.24

COMMENTS

Year round chlorination is conducted at this plant. In 1964, a total of 26,223 pounds of chlorine were required for an average dosage of 3.24 ppm.

CONCLUSIONS

This report has given in detail significant data on the operation of the various treatment units at the Brampton-Chinguacousy Water Pollution Control Plant.

This plant is grossly overloaded and the fact that treatment is achieved is a tribute to the operating staff.

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